

WHAT IS CLAIMED IS:

1. A transmission diffraction grating body comprising:
a base material being substantially transparent with respect to
5 wavelength $\lambda 1$ and having a refractive index $n0$;
another base material being substantially transparent with respect to
wavelength $\lambda 1$ and having a refractive index $n1$, which is formed on the base
material having a refractive index $n0$; and
a relief diffraction grating formed on the base material having a
10 refractive index $n1$; wherein:
the refractive indexes $n1$ and $n0$ satisfy the following relationship:
$$n1 > n0.$$

2. The diffraction grating body according to claim 1, wherein the
15 diffraction grating is formed of a concave portion and a convex portion having
rectangular-shaped cross sections, and the level difference h between the
concave portion and the convex portion satisfies the following relationship:

$$h = \lambda 1 / (n1 - 1)$$

- 20 and the difference in an optical path between the concave portion and the
convex portion is set to correspond to one wavelength with respect to the
wavelength $\lambda 1$.

- 25 3. The diffraction grating body according to claim 1, wherein the
refractive index $n1$ is 1.9 or more.

4. The diffraction grating body according to claim 1, wherein a material
of the base material having the refractive index $n1$ is at least one material
30 selected from the group consisting of Ta_2O_5 , TiO_2 , ZrO_2 , Nb_2O_3 , ZnS , $LiNbO_3$
and $LiTaO_3$.

5. The diffraction grating body according to claim 1, wherein the
35 diffraction grating is formed of a concave portion and a convex portion having
rectangular-shaped cross sections, and the film thickness of the base material
having the refractive index $n1$ is the same as the level difference h between
the concave portion and the convex portion.

6. The diffraction grating body according to claim 1, further comprising an anti-reflection film in the interface between the base material having a refractive index n_1 and the air, and the interface between the base material having the refractive index n_1 and the base material having a refractive index n_0 .

7. A transmission diffraction grating body, comprising a base material, and a relief diffraction grating formed on the base material, wherein the diffraction grating body is formed of a single base material; and the refractive index n_1 of the single base material is 1.9 or more.

8. The diffraction grating body according to claim 7, wherein the diffraction grating is formed of a concave portion and a convex portion having rectangular-shaped cross sections, and the level difference h between the concave portion and the convex portion satisfies the following relationship:

$$h = \lambda_1 / (n_1 - 1)$$

20 and the difference in an optical path between the concave portion and the convex portion is set to correspond to one wavelength with respect to the wavelength λ_1 .

9. The diffraction grating body according to claim 7, wherein a material of the single base material is at least one material selected from the group consisting of Ta_2O_5 , TiO_2 , ZrO_2 , Nb_2O_5 , ZnS , $LiNbO_3$ and $LiTaO_3$.

10. A semiconductor laser apparatus provided with a diffraction grating body according to any one of claims 1 to 9, comprising:

30 a semiconductor laser for emitting a light beam with wavelength λ_1 and a light beam with wavelength λ_2 ; and

a photodetector for receiving the light beams emitted from the semiconductor laser and carrying out photoelectric conversion; wherein:

35 the diffraction grating body receives the light beam with wavelength λ_2 and transmits a main beam and generates sub-beams that are \pm first order diffracted light; and

the diffraction grating body, the semiconductor laser and the

photodetector are integrated into one package.

11. An optical pick-up provided with a diffraction grating body according to any one of claims 1 to 9, comprising:

5 a first semiconductor laser light source for emitting a light beam with wavelength λ_1 ;

a second semiconductor laser light source for emitting a light beam with wavelength λ_2 ;

10 an optical system for receiving the light beam with wavelength λ_1 and the light beam with wavelength λ_2 and converging the light beam onto a microspot on the optical disk;

a diffraction means for diffracting a light beam reflected from the optical disk; and

15 a photodetector having a photo detecting portion for receiving the diffracted light diffracted by the diffraction means to output electrical signals in accordance with the amount of the diffracted light; wherein

the diffraction grating body receives the light beam with wavelength λ_2 and transmits a main beam and generates sub-beams that are \pm first order diffracted light.

20

12. The optical pick-up according to claim 11, wherein the photo detecting portion comprises a photo detecting portion PD0 for receiving a +first order diffracted light from the diffraction means, and a distance d1 between the center of the photo detecting portion PD0 and the light emitting spot of the first semiconductor laser light source and a distance d2 between the center of the photo detecting portion PD0 and the light emitting spot of the second semiconductor laser light source substantially satisfy the following relationship:

25

30

$$\lambda_1 / \lambda_2 = d_1 / d_2.$$

13. The optical pick-up according to claim 11, wherein the diffraction grating body, the semiconductor laser and the photodetector are integrated into one package.

35

14. An optical information apparatus provided with the optical pick-up according to claim 11, comprising:

